P41: Programmable Chiral Plasmonic Nanoparticles with Giant Optical Activity
Hye-Eun Lee[1], Hyo-Yong Ahn[1], Yoon Young Lee[1], Jungho Mun[2], Junsuk Rho[2], Ki Tae Nam[1]
[1] *Seoul National University (Korea),* [2] *Pohang University of Science and Technology (POSTECH) (Korea)*

We fabricated unprecedented three dimensional chiral plasmonic nanostructures by integrating organic-inorganic interaction in nanoparticle growth. Depending on the functional group in organic molecule, binding energy onto gold surface was modulated and we use this control over shape to address fabrication of asymmetric structure with nanometer controllability. Fabricated chiral gold nanoparticle exhibited extremely high dissymmetry factor at visible range ($\sim$0.2 at 622 nm) superior to any other structures produced by bottom-up approaches and showed macroscopic color transformation even in random dispersion.

P42: Surface waves guided by metamaterials with rotational disorder
T. Gric[1], O. Hess[2]
[1] *Vilnius Gediminas Technical University (Lithuania),* [2] *Imperial College London (UK)*

The analytical analysis of the metamaterial boundary with the rotational disorder reveals both bound and leaky surface plasmon (SP) modes. The dispersion relations of SPs propagating on a surface of these metamaterials are presented along with the propagation lengths. The rigorous modeling and analysis of surface waves at the boundary of two metamaterials possessing rotational disorder are presented.

P43: Emergent and Nonlinear Properties of Macroscopic Quantum Superconducting Metamaterials
Melissa Trepanier, Daimeng Zhang, Edward Ott, Thomas Antonsen, Steven M. Anlage
University of Maryland (USA)

The analytical analysis of the metamaterial boundary with the rotational disorder reveals both bound and leaky surface plasmon (SP) modes. The dispersion relations of SPs propagating on a surface of these metamaterials are presented along with the propagation lengths. The rigorous modeling and analysis of surface waves at the boundary of two metamaterials possessing rotational disorder are presented.

P44: Enormous Nonresonant THz Field Enhancement with Nanoslits
Om Krishna Suwal, Dai-Sik Kim
Seoul National University (Korea)

Transmission of Terahertz (THz) electromagnetic wave through a substrate is encumbered because of scattering, multiple reflections, absorption, and Fabry-Perot effects when the wave interacts with the substrate. To exclude the undesired interaction of electromagnetic wave with substrates, we investigated THz transmission through a substrate-free nanoslits.

P45: Application of microchip laser for high resolution 3D printing
D. Perevoznik, K. Kurselis, R. Kiyan, B. N. Chichkov
Laser Zentrum Hannover e.V. (Germany)

Application of Q-switched microchip laser for 3D printing by two-photon polymerization is reported. With optimized laser configuration and photo-resist high resolution high throughput 3D printing of polymer is achieved

P46: Quantum states and transport in PT-symmetric quasi-one-dimensional lattices
Jung-Wan Ryu, Nojoon Myoung, Hee Chul Park
Institute for Basic Science (Korea)

We study quantum transport in PT-symmetric quasi-one-dimensional lattices in which complex band structures appear. Quantum transport in the lattice is measured only in the unbroken PT-symmetric phases in the energy band but not in the broken PT-symmetric phases. We devise a mechanism for reconfiguration of quantum states that is related to PT-phase transition between regions of broken and unbroken PT-symmetry.

P47: Combinational Analysis of 2D metamaterials using AFM-IR and s-SNOM
Eoghan Dillon[1], Hyuk Woo Jun[2]
[1] *Anasys Instruments (USA),* [2] *Scinco (Korea)*

This poster will discuss two techniques (1) AFM-based infrared spectroscopy and (2) scattering scanning near field optical microscopy (s-SNOM). Both of these techniques overcome the diffraction limit, providing the ability to measure and map chemical and optical properties with nanometer scale spatial resolution. This talk will focus on the applications of both AFM-IR and s-SNOM to the characterization of a variety of 2D materials, including, nanoantenna arrays and 2D metasurfaces.